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- 1 1. A sample collection device for use with a slab gel electrophoresis system having
2 one or more lanes, the sample collection system comprising:
3 a detection zone within the slab gel;
4 a detector for detecting a sample of interest within the detection zone; and
5 a collector for collecting the detected sample of interest.
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- 7 2. The sample collection device of claim 1 further comprising a gel free zone within
8 the slab gel.
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- 10 3. The sample collection device of claim 2, wherein the gel free zone is filled with a
11 buffer solution.
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- 13 4. The sample collection device of claim 2, wherein the detection zone and the gel
14 free zone are aligned with each other.
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- 16 5. The collection device of claim 1, wherein the collector comprises an energizable
17 syringe pump operably connected to the detector, the energizable syringe pump
18 configured to direct a low volume of liquid buffer solution onto a detected sample of
19 interest, thereby collecting the sample of interest within the stream of buffer solution.
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- 21 6. The collection device of claim 5, wherein the collector further comprises a sample
22 collection vial configured to receive the stream of liquid buffer solution and the collected
23 sample of interest.
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1 7. The sample collection system of claim 5, wherein the buffer solution is selected
2 from the group consisting of TAE and TBE.

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4 8. The collection system of claim 1, wherein the detector comprises a fluorescent tag
5 attachable to a sample of interest.

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7 9. The collection system of claim 8, wherein the detector further comprises a laser
8 positioned to direct a laser beam to excite the fluorescent tag within the detection zone.

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10 10. The collection system of claim 9, wherein the laser beam is scanned between
11 multiple lanes of the slab gel.

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13 11. The collection system of claim 9, further comprising one or more transmission
14 optical fibers connecting the laser with one or more detection zones of a slab gel, the one
15 or more transmission optical fibers configured to transmit a laser beam from the laser to
16 one or more detection zones.

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18 12. The collection system of claim 9, wherein the laser is an argon ion laser.

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20 13. The collection system of claim 9, wherein the detector further comprises one or
21 more collection optical fiber imbedded within the gel.

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23 14. The collection system of claim 13, wherein the one or more collection optical
24 fibers are positioned adjacent one of the one or more sample lanes and to collect light
25 emitted from the fluorescent tag.

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1 15. The collection system of claim 9, wherein the detector further comprises low-level
2 light detection electronics.

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4 16. The collection system of claim 15, wherein the low-level light detection
5 electronics are selected from the group comprising photomultipliers, photodiodes and
6 CCD cameras.

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8 17. The collection system of claim 15, wherein the detector further comprises an
9 optical filter positioned between a collection optical fiber imbedded within the gel and the
10 low-level light detection electronics

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12 18. The collection system of claim 17, wherein the optical filter comprises a high
13 band pass filter for filtering light with a wavelength greater than about 500 nm and a
14 notch filter.

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16 19. The collection system of claim 18, wherein the optical filter comprises a narrow
17 band pass filter which filters light other than light with a wavelength corresponding to the
18 wavelength of the light emitted from the fluorescent label, ± 10 nm.

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20 20. The sample collection system of claim 1, wherein the sample of interest is
21 selected from the group comprising a nucleic acid, a polypeptide, and a protein.

1 21. A sample collection system for use with an electrophoretic slab gel having one or
2 more sample lanes, the sample collection system comprising:

3 a detection zone within the slab gel;
4 a fluorescent tag attachable to a sample of interest,
5 a laser configured to direct a laser beam on the fluorescent tag when the sample of
6 interest is within the detection zone, the laser beam exciting the fluorescent tag;
7 low-level light detection electronics positioned to detect light from the excited
8 fluorescent tag; and
9 a collector for collecting the detected sample of interest.

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11 22. The collection device of claim 21, wherein the collector comprises an energizable
12 syringe pump operably connected to the low level light detection electronics, the
13 energizable syringe pump configured to direct a stream of liquid buffer solution onto a
14 sample of interest within a gel free zone, thereby collecting the sample of interest within
15 the stream of buffer solution.

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17 23. The collection device of claim 22, wherein the collector further comprises a
18 sample collection vial configured to receive the stream of liquid buffer solution and the
19 collected sample of interest.

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21 24. The collection system of claim 21, wherein the laser is an argon ion laser.

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23 25. The collection system of claim 21, wherein the fluorescent tag is selected from the
24 group consisting of PICO Green, TO-PRO 1, and TO-PRO 3.
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1 26. The collection system of claim 21, further comprising a collection optical fiber
2 imbedded within the slab gel and positioned to collect fluoresce from the excited
3 fluorescent tag.

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5 27. The collection system of claim 26, further comprising an optical filter positioned
6 between the optical fiber and the low-level light detection electronics.

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8 28. The collection system of claim 29, wherein the optical fiber is positioned adjacent
9 one of the one or more sample lanes and to collect light emitted from the fluorescent tag.

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11 29. The collection system of claim 21, wherein the low-level light detection
12 electronics are selected from the group comprising photomultipliers, photodiodes and
13 CCD cameras.

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15 30. The sample collection system of claim 21, wherein the sample of interest is
16 selected from the group comprising a nucleic acid, a polypeptide, and a protein.

1 31. A method of collecting a sample band from a electrophoresis slab gel, the method
2 comprising:

3 obtaining a sample of interest;

4 loading the sample of interest into a lane of a gel electrophoresis system with one
5 or more sample lanes, the gel electrophoresis system comprising a sample collection
6 system comprising a detection zone within the slab gel, a detector for detecting a sample
7 of interest within the detection zone, and a collector for collecting the detected sample of
8 interest;

9 detecting a sample within the detection zone; and

10 collecting the sample of interest from the slab gel.
11

12 32. The method of claim 31, wherein the collector comprises an energizable syringe
13 pump operably connected to the detector, the energizable syringe pump configured to
14 direct a stream of liquid buffer solution onto a detected sample of interest within a gel
15 free zone, thereby collecting the sample of interest within the stream of buffer solution,
16 the method further comprising energizing the syringe pump.
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18 33. The method of claim 31, wherein the sample of interest is selected from the group
19 comprising a nucleic acid, a polypeptide, and a protein.
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21 34. The method of claim 31, wherein the detector comprises a fluorescent tag
22 attachable to a sample of interest.
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1 35. The method of claim 31, wherein the detector comprises a laser positioned direct
2 a laser beam on the fluorescent tag, the laser beam exciting the fluorescent tag within the
3 detection zone, the method further comprising activating the laser to excite the
4 fluorescent tag.

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6 36. The method of claim 31, wherein the detector further comprises low-level light
7 detection electronics.

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9 37. The method of claim 36, wherein the low-level light detection electronics are
10 selected from the group comprising photomultipliers, photodiodes and CCD cameras.

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